

# Virginia-Class Submarine Indiana is Delivered to U.S. Navy

NEWPORT NEWS, Va. – Huntington Ingalls Industries' Newport News Shipbuilding division delivered the newest nuclear-powered fast-attack submarine to the U.S. Navy, the company said in a June 25 release.

The future USS Indiana (SSN 789) is the 16th Virginia-class submarine built as part of the teaming agreement with General Dynamics Electric Boat and the eighth delivered by Newport News.

“We are proud to deliver Indiana to the Navy,” said Dave Bolcar, Newport News' vice president of submarine construction. “For the nearly 4,000 shipbuilders who participated in construction of the boat, there is nothing more important than knowing that this vessel will support the Navy's missions.”

Indiana, which began construction in September 2012, successfully completed sea trials earlier this month. The vessel will be commissioned later this year.

Virginia-class submarines are built for a broad spectrum of open-ocean and littoral missions to replace the Navy's Los Angeles-class submarines as they are retired. Virginia-class submarines incorporate dozens of new technologies and innovations that increase firepower, maneuverability and stealth and significantly enhance their warfighting capabilities. These submarines are capable of supporting multiple mission areas and can operate at submerged speeds of more than 25 knots for months at a time.

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# Navy Developing Ship Coatings to Reduce Fuel, Energy Costs

ARLINGTON, Va. – It can repel water, oil, alcohol and even peanut butter. And it might save the U.S. Navy millions of dollars in ship fuel costs, reduce the amount of energy that vessels consume and improve operational efficiency.

The Office of Naval Research (ONR) is sponsoring work by Dr. Anish Tuteja, an associate professor of materials science and engineering at the University of Michigan, to develop a new type of “omniphobic” coating. This chemical coating is clear, durable, can be applied to numerous surfaces and sheds just about any liquid.

Of particular interest to the Navy is how omniphobic coatings can reduce friction drag – resistance created by the movement of a hull through water – on ships, submarines and unmanned underwater vessels.

Compare friction drag to jogging through a swimming pool. Because of the water’s resistance, each stride is more difficult and requires more energy and effort.

“A significant percentage of a ship’s fuel consumption [up to 80 percent at lower speeds and 40 to 50 percent at higher speeds] goes toward maintaining its speed and overcoming friction drag,” said Dr. Ki-Han Kim, a program officer in ONR’s Sea Warfare and Weapons Department. “If we could find a way to drastically reduce friction drag, vessels would consume less fuel or battery power, and enjoy a greater range of operations.”

Tuteja’s omniphobic coating could be a solution. Picture two

ships sailing at the same speed – one dealing with friction drag and the other covered in a coating that causes water to bead up and slide off the hull easily. The coated vessel theoretically would guzzle less fuel because it doesn't have to fight as much water resistance while maintaining speed.

While repellent coatings aren't new, it's hard to create one that resists most liquids and is tough enough to stick to various surfaces for long periods of time. Take a Teflon-coated pan, for example. Water will bead up and roll off the pan, while cooking oil will spread everywhere.

“Researchers may take a very durable polymer matrix and a very repellent filler and mix them,” said Tuteja. “But this doesn't necessarily yield a durable, repellent coating. Different polymers and fillers have different miscibilities [the ability of two substances to mix together]. Simply combining the most durable individual constituents doesn't yield the most durable composite coating.”

To engineer their innovative coating, Tuteja and his research team studied vast computer databases of known chemical substances. They then entered complex mathematical equations, based on each substance's molecular properties, to predict how any two would behave when blended. After analyzing hundreds of combinations, researchers found the right mix.

The molecular marriage was a hit during laboratory tests. The rubber-like combo can be sprayed, brushed, dipped or spin-coated onto numerous surfaces, and it binds tightly. The coating also can withstand scratching, denting and other hazards of daily use. And the way the molecules separate makes the coating optically clear.

Besides reducing friction drag, Tuteja envisions other Navy uses for the omniphobic coating – including protecting high-value equipment like sensors, radars and antennas from weather.

In addition to omniphobic coatings to lessen friction drag, ONR is sponsoring other types of coating research to prevent corrosion on both ships and aircraft and fight biofouling (the buildup of barnacles on hulls). Similar coatings can also prevent ice from forming on ships operating in cold regions, or make ice removal much easier than conventional methods like scraping.

Tuteja's team is conducting further tests on the omniphobic coating, but they plan to have it ready for small-scale military and civilian use within the next couple of years.

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## **Coast Guard Cutter Campbell Returns with \$209 Million Cocaine Seizure**

BOSTON – The Coast Guard Cutter Campbell returned to its homeport in Kittery, Maine, June 15 after an 80-day counternarcotic patrol in the Caribbean Sea and Eastern Pacific Ocean, the Coast Guard 1st District said in a release.

Campbell's crew disrupted six narcotic smuggling ventures, seized about 12,000 pounds of cocaine worth \$209 million and detained 24 suspected smugglers.

Equipped with an MH-65 Dolphin helicopter crew deployed from the Helicopter Interdiction Tactical Squadron unit based in Jacksonville, Florida, Campbell patrolled known narcotic transit zones in the Eastern Pacific Ocean off the coast of Central and South America in support of Joint Interagency Task Force-South, which facilitates international and interagency interdiction to enable the disruption and dismantlement of

illicit and converging threat networks in support of national and hemispheric security.

Campbell's crew also rescued three sea turtles found entangled in loose fishing gear.

"During this challenging deployment, the crew excelled in all assigned missions and should be exceptionally proud of their accomplishments," said Cmdr. Mark McDonnell, Campbell's commanding officer. "Our efforts to integrate with partner agencies and nations are key to the safe and successful execution of these complex interdiction operations as we work together to remove cocaine bound for the United States and help dismantle criminal networks."

Campbell is a 29-year-old Famous-class medium-endurance cutter, with a crew complement of 100.

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## **Commander Nominated for Resurrected U.S. Second Fleet**

ARLINGTON, Va. – President Donald J Trump has nominated Vice Adm.

Andrew L. Lewis to command the new U.S. Second Fleet, to be headquartered in Norfolk, Virginia.

Lewis, a naval aviator, has served as deputy chief of naval operations for Operations, Plans and Strategy since August. He began

his career as an A-7 attack pilot and later made the transition to the

F/A-18. He has flown 100 combat missions during numerous operations in

Southwest Asia since 1991. He was the recipient of the Naval Air Forces Pacific Pilot of the Year award in 1996.

His command tours include Carrier Strike Group 12, deploying with USS Theodore Roosevelt; Naval Strike and Air Warfare Center; Carrier Air Wing 3, deploying with USS Harry S. Truman; Strike Fighter Squadron (VFA) 106; and VFA-15, deploying on USS Enterprise and USS Theodore Roosevelt.

The chief of naval operations, Adm. John Richardson, announced the establishment of the fleet during a change of command ceremony for U.S. Fleet Forces Command (USFF) in Norfolk, May 4, the Navy said in a release. The new fleet will report to USFF.

“Second Fleet will exercise operational and administrative authorities over assigned ships, aircraft and landing forces on the East Coast and northern Atlantic Ocean,” the release said. “Additionally, it will plan and conduct maritime, joint and combined operations and will train, certify and provide maritime forces to respond to global contingencies.

In its former iteration, Second Fleet generated forces to support operations in the North Atlantic, as well as U.S. Sixth Fleet in the Mediterranean Sea, the Middle East Force (later U.S. Fifth Fleet) in

the Persian Gulf and, occasionally, U.S. Seventh Fleet during the Vietnam War. The fleet figured prominently in the Navy's Maritime Strategy of the Cold War Era, when the Second Fleet staff would embark in a flagship for exercises in the North Atlantic and Norwegian Sea as a bulwark against the Soviet Union. The former Second Fleet was disestablished in 2011.

As noted by U.S. European Command, the Russian Navy has become more active in recent years in the Northern Atlantic and the Mediterranean Sea. U.S. Sixth Fleet in recent years has operated more frequently in the Baltic and Black Seas.

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## **Marines Stage on Expeditionary Mobile Base Ship USS Puller for Real-World Operation**

ARLINGTON, Va. – A Marine Air-Ground Task Force-Crisis Response (MAGTF-CR) has used a Navy expeditionary mobile base ship (ESB) for a quick-reaction movement in the Persian Gulf, the task force commander said.

Speaking June 8 to the Potomac Institute, Col. Christopher Gideons, commander of SPMAGTF-CR-Central Command from August

2017 to April, said that elements of the task force were called upon to stage to the United Arab Emirates in preparation for a maritime intercept operation (MIO) in the region.

After arrival, the task elements staged to the USS Lewis B. Puller, a newly commissioned ESB assigned to the U.S. Fifth Fleet that supports a variety of forces including mine countermeasures forces, special operations forces, patrol boats and other units.

Gideons said MV-22B Osprey tiltrotor transport aircraft were staged to the flight deck of Puller along with an infantry contingent of about 200 Marines. The MIO of an unspecified nature was planned and rehearsed, he said, but ultimately the force was told to stand down when the MIO was canceled by higher authority.

“The team did a great job,” Gideons said.

He praised the capabilities of the ESB, with its large flight deck, spacious hangar deck and rotorcraft refueling capability.

One challenge of the operation was getting needed gear on the ship and sustaining the force, he noted.

The use of an alternate platform – the ESB – in this case was necessitated by the lack of an amphibious ready group (ARG) with an embarked Marine Expeditionary Unit (MEU), as pointed out during the presentation by retired Marine Corps Commandant Gen. Alfred M. Gray Jr., who also highlighted the shortage of amphibious warfare ships that necessitates the existence of SPMAGTFs.

There was a 100-day gap in the presence of an ARG/MEU when Gideons’ SPMAGTF was in theater, Gideons said.

The SPMAGTF also operated from the French Navy helicopter

carrier FS Tonnere during the deployment.

The SPMAGTFs were created in 2014 in response to the 2012 attack on the U.S. government facilities in Benghazi, Libya, in which four Americans were killed in a siege with no ARG/MEU available in the Mediterranean Sea to rescue them.

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## **Wave Gliders Selected to Study Arctic and Southern Oceans**

SUNNYVALE, Calif. – Oceanographers from Scripps Institution of Oceanography (Scripps) and the Applied Physics Laboratory of the University of Washington (APL-UW) have selected Wave Glider long-duration ocean robots as their sensor platform to conduct advanced scientific research in the most inhospitable and remote regions of the Arctic and Southern oceans, according to a June 5 release from Liquid Robotics, a Boeing company.

Using Liquid Robotics Wave Gliders, proven in extreme ocean conditions (sea state 6-plus), scientists will obtain real time data and rare insights into the dynamic conditions that drive the world's weather and climate. This data is critical for scientists to understand and improve global ocean weather modeling and climate prediction.

The oceanographers leading these important missions are:

- Dr. Eric Terrill and Dr. Sophia Merrifield, Coastal Observing Research and Development Center, Scripps.
- Dr. Ken Melville and his team at the Air-Sea Interaction Laboratory, Scripps.

■ Dr. Jim Thomson and his team in the Stratified Ocean Dynamics of the Arctic program at the APL-UW.

Each team will integrate sophisticated oceanographic and atmospheric sensors onto the Wave Gliders to measure extreme wave states, winds, temperature and salinity in the upper layers of the ocean. Historically, these regions have been undersampled due to the dangers and risks of operating in these turbulent oceans. With the help of unmanned systems, the oceanographers will be able to observe the real time weather and climate conditions safely from shore.

“The reliability of the platform, modular payloads, and proven navigation capabilities led to our decision to select the Wave Glider for our upcoming science program,” said Terrill, director of the Coastal Observing R&D Center at Scripps. “Tackling at-sea science questions has plenty of challenges and we needed a platform we could trust and adapt. The modularity allows us to deploy our own sensors and adapt autonomy algorithms so that the vehicle will optimally sample the ocean.”

Working together with Liquid Robotics, these oceanographers have successfully conducted long-duration scientific missions in the Arctic, Pacific, Southern and the North Atlantic oceans. Exploring the vast, remote regions of our ocean, especially in the Arctic and Antarctica, is incredibly challenging. Deploying Wave Gliders in the most energetic sea conditions on Earth will help scientists gain a better understanding and modeling of our changing planet.

“In 2016, we successfully completed a three-month, 2,000-kilometer mission in the Southern Ocean where the Wave Glider performed through 6-meter-high waves, extreme winds and swam through the world’s largest ocean current, the Antarctic Circumpolar Current,” said Thomson, senior principal oceanographer at the APL-UW. “The data collected provided unprecedented temporal and spatial coverage and I have great

confidence our upcoming Arctic mission in the Beaufort Sea, part of the Stratified Ocean Dynamics of the Arctic, will again provide valuable insights.”

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## **Marine Corps to Award Orders for Cold Weather Boots and Socks**

MARINE CORPS BASE QUANTICO, Va. – Marines will stay warm during ambient cold weather operations with new boots and socks. Marine Corps Systems Command (MCSC) intends to award sole source purchase orders for two types of Intense Cold Weather Boots (ICWBs) and Intense Cold Weather Socks (ICWSs) to improve Marines’ performance in cold weather environments. A total of 2,000 boots and 50,000 pairs of socks will be delivered from four vendors by Sept. 28.

“Based on market research, industry days and events such as Modern Day Marine, we narrowed our decision for the orders down to two companies for cold weather boots and two for socks,” said Todd Towles, program analyst for the Clothing and Equipment Team at MCSC.

There are currently no Marine Corps issue boots designed for use in the -20 to 20 degrees Fahrenheit range. The Temperate Weather Marine Corps Combat Boot was designed for a temperature range between 20 to 60 degrees Fahrenheit, and the Extreme Cold Weather Vapor Barrier Boot was designed for a range between -65 to -20 degrees Fahrenheit.

This effort to acquire the cold weather boots and socks will help MCSC evaluate commercial, off-the-shelf solutions and

offer the potential to reduce or eliminate the current environmental protection gap, said Towles. The socks will have much higher wool content than the polypropylene wool socks Marines currently use. Additionally, the Clothing and Equipment Team is hopeful the new gear will offer increased water repellency, comfort and insulation in extreme cold weather environments.

MCSC's Program Manager Infantry Combat Equipment will conduct a field user evaluation December through March. The team will gather input from Marines as they wear the ICWB and ICWS prototypes at the Mountain Warfare Training Center, Fort McCoy and Norway.

Feedback regarding fit, form and function will be collected along with how well both prototypes of the ICWB and ICWS perform in sub-zero temperatures.

"The Army is conducting evaluations with similar boots and socks, so there is potential to have some consistency with our results and products," said Lt. Col. Chris Madeline, program manager for ICE. "Marines will keep the prototype boots through the duration of testing. Once data is collected, it will inform future acquisition decisions and allow the Corps to purchase boots and socks that bridge the gap between the existing cold weather boots."

The Clothing and Equipment Team falls under Program Manager Infantry Combat Equipment at MCSC.

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## **Schultz Takes the Helm as**

# Coast Guard Commandant

WASHINGTON – Adm. Karl L. Schultz took command of the U.S. Coast Guard during a June 1 ceremony at Coast Guard headquarters presided over by President Donald J. Trump and attended by most of the Joint Chiefs of Staff, homeland security officials, a large international contingent, current and former Coast Guard members, and family and friends.

“Today is a day of hails, a day of farewells and a day of thank yous,” Homeland Security Secretary Kirstjen Nielsen said in her introductory remarks at the change of command, which marked the end of the four-year tenure as commandant of Adm. Paul F. Zukunft, who officially retired from the Coast Guard in a ceremony immediately following the event.

“‘Service above self,’ an Adm. Zukunft quote, is a reflection of his 40 years of service in the Coast Guard, words to live by that I share,” she said.

Zukunft became the 25th commandant on May 30, 2014. His leadership and vision were instrumental in increasing the pace of the Coast Guard’s recapitalization efforts, according to a release from the service. He worked with Congress and the White House to achieve funding for completion of the national security cutter program of record, the acquisition of new fast response cutters, and funding for the waterways commerce cutter and the offshore patrol cutter. He also ensured the Coast Guard began receiving necessary funding for the acquisition of the nation’s first new polar icebreaker in more than 40 years.

Zukunft led the service’s efforts to respond to the unprecedented 2017 hurricane season, where Coast Guard personnel saved or assisted nearly 12,000 victims from flooded communities in Texas, Florida and Puerto Rico.

Schultz reports to Coast Guard headquarters as the 26thh

commandant from Portsmouth, Virginia, where he served as the Atlantic Area commander since August 2016, directing all Coast Guard missions from the Rocky Mountains to the Arabian Gulf, spanning across five districts and 40 states.

Noting Schultz's oversight of last summer's hurricane response as Atlantic Area commander, Nielsen said "confidence, leadership and dedication to country was evident in the mission. As he assumes command today as the commandant of the Coast Guard, President Trump and I have full confidence in Adm. Schultz's ability to lead this proud organization with honor and integrity."

"We're gathered together today for a truly special occasion," Trump said during his remarks. "We are here to mark a change in command of the United States Coast Guard and celebrate the incredible career of its 25th commandant, Adm. Paul Zukunft. On behalf of the American people, I thank you for a lifetime of noble service. Congratulations on everything you have achieved for nearly half a century. For 45 years, Paul has proudly worn the Coast Guard uniform. That's a long time, you don't look that old," he joked.

"In that time, he has led every kind of mission never backed down ... he's never lost a challenge," Trump said. "For the last four years, Adm. Zukunft ... has led with extraordinary skill, devotion and pride. ... Throughout the admiral's tenure, he poured his heart and soul into the service of our nation and he brought remarkable vision to the task of ensuring the Coast Guard's rightful place at the forefront of American security and prosperity. America is safe because our Coast Guard is strong."

Trump also thanked Zukunft's wife, Fran DeNinno-Zukunft for her own service as a devoted mentor and representative for military families.

"We are grateful for everything you've done to advance the

Coast Guard mission, it's been a lot," he said.

After highlighting some of the Coast Guard's accomplishment's during Zukunft's tenure, Trump praised last year's "unbelievable" hurricane response and noted that, "with this ceremony we proudly pass the helm of the United States Coast Guard to the man who oversaw those emergency operations."

Echoing Nielsen's comments about Schultz, Trump said, "I have complete confidence that Karl will carry out his new mission with the same talent, strength and devotion that have characterized his entire career. He has had an incredible and very brave career. Karl, we congratulate you and we thank you for answering this call to service. ...

The change of command, Trump said, comes "at a great moment, not just for the Coast Guard, but for our entire nation. Your service makes all of America proud. American knows that we can always count on the Coast Guard because the Coast Guard is always ready."

"Today is the first day of hurricane season, this is a good day to cut and run," Zukunft quipped, after receiving the orders relieving him of command. He used a series of baseball analogies to describe his tenure as commandant.

"When I came into this position, I told my senior leadership team that it is high time that we swung for the fences. For too many years we went up to the plate and squared around to bunt. You're never going to hit a ball out of the park when you bunt every time you step up to the plate. Well swing we did. ... 2018 was the largest appropriation for the United States Coast Guard," he said.

"When I look what we are investing in, our fleet of national security cutters, originally this was going to be a fleet of eight, we now have 11 on budget and under construction. The offshore patrol cutter, it was a hope in 2014 ... well it's a reality, the first one will hit the water in 2021, with many

more to follow. ... And we're building polar icebreakers, the first one arrives in 2023. ... We're building out a fleet of what we call waterway commerce cutters. In 2019, we will open up a cyber curriculum at the U.S. Coast Guard Academy. We have to grow the talent. We're also investing in unmanned aerial systems. ... We're investing our people as well, we're growing the force.

"Yes, we swung for the fences, we hit a home run, but this is an infinite game and the game goes on and, yes, it must go on," he said.

After reading his orders to report for duty as commandant, Schultz pledged to carry on the work that had begun under Zukunft's watch.

"Our Coast Guard is in fact strong. We have been a well-run and led organization. The privilege of assuming command today is amplified by the fact that this will be a seamless transition. Much more about a continuity of command than a changing of command. ... As I survey the waters and the opportunities that lie ahead for this service, I envision our heading remaining generally steady, but we'll look to pick up spend when possible and where appropriate," Schultz said.

"As I assume my new duties, I am confident that we have built a strong leadership team. We are eager to get about the work of leading this Coast Guard."

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## **New 'Rebreather' Helps Navy**

# Divers Beneath the Waves

ARLINGTON, Va. – The U.S. Navy diver hoisted a 60-pound life-support regulator onto his back, then donned a 30-pound metal helmet. Fellow divers connected his diving suit to an “umbilical” hose pumping in breathing gas and establishing communications with the surface. After receiving approval to hit the water, the diver descended into a large test pool at Naval Surface Warfare Center Panama City (NSWC), Florida – home to the Navy Experimental Diving Unit.

The diver’s mission: demonstrate the effectiveness of the MK29 Mixed Gas Rebreather – a new prototype system that’s the first of its kind within the Navy diving community, developed by NSWC Panama City.

The technology is sponsored by the Office of Naval Research Global (ONR Global) TechSolutions program. TechSolutions is ONR Global’s rapid-response science and technology program that develops prototype technologies to address problems voiced by Sailors and Marines, usually within 12 months.

“This rebreather system is an awesome opportunity to enhance the capabilities of Navy divers and accelerate their deployments,” said ONR Command Master Chief Matt Matteson, who heads up TechSolutions.

Navy diving missions include underwater rescues, explosive ordnance disposal, ship hull maintenance, recovery of sunken equipment, and salvage of vessels and aircraft.

Beneath the waves, Navy divers breathe a careful mixture of oxygen and nitrogen. Below 150 feet, however, nitrogen becomes toxic – leading to nitrogen narcosis, a drowsy state that can dull mental sharpness severely and jeopardize safe return to the surface.

The solution is to replace nitrogen with helium. However,

helium is expensive and hard to obtain because of recent worldwide shortages. And the Navy needs a lot of it for missions and training exercises, requiring canisters of the gas to be transported on accompanying ships or planes.

The MK29 rebreather solves these problems. Used oxygen-helium is filtered through a carbon dioxide scrubber – which removes carbon dioxide and recycles the breathable gasses back to the diver.

The result? Very little venting (giveaway bubbles) – or wasted helium.

“The MK29 decreases helium requirements by approximately 80 percent,” said Dr. John Camperman, a senior scientist overseeing the development of the MK29 at NSWC Panama City. “Divers can perform more dives with the same amount of gas or bring less helium.”

Test results suggest this system will be a major asset to Navy divers-who cannot only perform more dives, but also stay underwater longer if surface supply gas is interrupted.

The MK29 even reduces breathing noise and fogging of helmet viewports. It’s also the first piece of Navy diving equipment to feature 3D-printed titanium tubing that connects hoses from the helmet’s breathing manifold to the regulator backpack. That titanium reduces the risk of breathing hoses being sliced by sharp or jagged underwater objects.

The idea for the MK29 came from a NSWC Panama City master diver, who contacted TechSolutions seeking a way to reduce helium consumption while using newly available rebreather technology. Recognizing the expertise of Camperman and his team, TechSolutions asked them to develop the MK29.

Camperman’s research team will conduct further MK29 tests this year-and hope to see the rebreather issued throughout the fleet by next year.

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# **HII Completes Initial Sea Trials of Virginia-Class Submarine Indiana**

NEWPORT NEWS, Va. – Huntington Ingalls Industries' Newport News Shipbuilding division has successfully completed the initial sea trials on the newest Virginia-class submarine, Indiana (SSN 789), the company announced in a May 25 release.

The initial round of sea trials, known as alpha trials, provides an opportunity to test all systems and components. It includes submerging for the first time and high-speed maneuvers while on the surface and submerged.

“Sea trials is a significant milestone and the first major test of [a] submarine’s capabilities at sea,” said Dave Bolcar, Newport News’ vice president of submarine construction. “We are pleased with how Indiana performed and look forward to continuing our testing program before we deliver the boat to the U.S. Navy later this year.”

Construction of Indiana began in 2012. The boat – the 16th Virginia-class submarine built as part of the teaming partnership with General Dynamics Electric Boat – was christened in April 2017. Indiana Video